

REMARKS

This application has been reviewed in light of the Office Action dated August 8, 2003. Claims 1-24 are presented for examination, of which claims 1, 9, and 23 have been amended to define more clearly what Applicant regards as his invention, and claim 20 has been amended as to matters of form. Claims 1, 8, 9, 20, 23, and 24 are in independent form. Favorable reconsideration is requested.

Claims 1-6, 8-14, and 16-24 are were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,214,751 (*Robert*) in view of US Patent No. 3,971,620 (*Everett*), and claims 7 and 15 were rejected under Section 103(a) as being unpatentable over *Robert* in view of *Everett* and in view of U.S. Patent No. 6,205,259 (*Komiya et al.*).

The aspect of the present invention set forth in claim 1 is an apparatus for processing image data defining a plurality of input images of a changing scene recorded from at least one of different viewing positions, different viewing directions, and at different times. The apparatus is operable to process the image data to generate data for defining a sequence of images conveying an evolving representation of the scene from a fixed viewing position and direction between the times at which the first and last input images were recorded. The apparatus includes an image registering unit, arranged to register the input images so that the registered input images represent the scene from the same viewing position and direction relative to the scene, and a pixel value interpolator, arranged to interpolate between pixel values of the registered input images to generate pixel values for interpolated images from the same viewing position and direction relative to the scene for the image sequence.

Among the important features of claim 1 is that the image registering unit is operable to register input images so that the registered input images represent the scene from the same viewing position and direction relative to the scene.

As discussed in the Amendment dated May 12, 2003, *Robert* relates to a method for temporal interpolation of images, enabling the reconstitution of the luminance value of the pixels of a missing image in a series of images representing the same object. The *Robert* method generates images representing images that would be recorded by a camera at different viewing positions and directions as the camera moves across a static scene.

The Office Action cites *Robert*, at column 19, lines 43-53, and Figure 14, as disclosing an image registerer for registering input images recorded at different times. Applicant respectfully disagrees with this understanding of *Robert*. Figure 14 and the cited passage describe a device 105 that implements formula (8) (column 19, lines 46 and 47). Equation (8) is set out at column 9, lines 58-67, where it is explicitly stated that the formula computes a luminance value. Accordingly, Applicant submits that nothing has been found, or pointed out, in *Robert* that would teach or suggest registering input images so that the registered input images represent the scene from the same viewing position and direction relative to the scene.

Another important feature of claim 1 is the pixel value interpolator interpolates between pixel values of the registered input images to generate pixel values for interpolated images from the same viewing position and direction relative to the scene for the image sequence. The Office Action cites *Robert* at column 3, lines 24-32, column 5, lines 25-36, and

Figure 2 for this feature. However, Applicant believes that the Examiner's understanding of this part of *Robert* is not correct.

Column 3, lines 24-32, of *Robert* discusses a method for the temporal interpolation of images for determining an interpolated luminance value for each pixel of an image called the image to be interpolated, from luminance values of pixels of a first image and of a second image called known images. *Robert*, at column 3, lines 24-32, is silent regarding the function of interpolation to generate pixel values for interpolated images from the same viewing position and direction relative to the scene. Further, neither column 5, lines 25-36, nor Figure 2 is seen to disclose interpolation to generate pixel values for interpolated images from the same viewing position and direction relative to the scene. Rather, Figure 2 and the accompanying description are merely concerned with the calculation of a velocity for a pixel. More particularly, each pixel of the motion carrier frame is considered as a father of a single pixel, called a son pixel, in the frame to be interpolated. These two pixels are assumed to represent the same point of the object in motion, which has a velocity vector that is known in the frame  $T_i$ , and is assumed to maintain the same velocity at all the time instants between  $T_a$  and  $T_b$ , even though it is represented by a series of pixels having different coordinates and which are all sons of a same father pixel. The method determines, in each frame to be interpolated, the center of a son pixel corresponding to a given father pixel, and then allocates to this son pixel a velocity vector equal to the velocity vector of its father pixel. Applicant submits that nothing has been found in *Robert* that would teach or suggest interpolation to generate pixel values for interpolated images from the same viewing position and direction relative to the scene, as recited in claim 1.

Accordingly, Applicant further submits that claim 1 is clearly patentable over *Robert*, taken alone.

*Everett* is not seen to remedy the deficiencies of *Robert*. Indeed, if *Everett* is combined with *Robert* as suggested by the Examiner, the resulting system would actually defeat the whole purpose of the *Robert* system, and in addition would teach away from the features recited in claim 1.

The Office Action cites Figure 8 and column 8, lines 7-19, of *Everett* as teaching a “fixed position”. In fact, this part of *Everett* describes a system in which photocells produce signals representing the shift of the sun's image from a fixed location in the image. These signals are processed and applied to a motor drive system which changes the viewing direction of the telescope to maintain the image in the fixed position within the image. Consequently, the sun's image never moves from the fixed position in the image.

Applicant submits that a *prima facie* case of obviousness has not been made out as to claim 1. A *prima facie* case of obviousness requires that three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference(s) or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art references when combined must teach or suggest all the claimed limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on the Applicant's own disclosure (M.P.E.P. § 2143). Further, if the proposed modification or combination of the prior art would

change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims *prima facie* obvious. *In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959).

Modifying the *Robert* system with the teachings of *Everett* results in a system that can no longer process the same input images as the original system of *Robert*. That is, the combined system cannot process images which have been pre-recorded. The *Everett* system requires an image to be processed in real time before the next image is recorded so that, if an object moves from the fixed position in the image, the viewing direction of the camera which records the images can be changed sufficiently quickly that the next image is recorded such that the object has not moved in the image.

Also, the result of a combination of *Everett* and *Robert* would render the interpolation function in *Robert* completely unnecessary. More particularly, in the combined system, if the object moves, then the viewing direction of the camera is moved in a corresponding manner with the result that the object has the same position in every image. Consequently, it is completely unnecessary to calculate pixel velocities and perform interpolation as described in *Robert* because the images never change. Instead, it would only be necessary to transmit the first image because every subsequent image would be the same.

It is also understood that an essential feature of the *Everett* system, and consequently a combined system of *Everett* and *Robert*, is that the viewing direction of the camera is specifically changed so that the object has the same position in every image. This is completely contrary to the features recited in claim 1, which recites an image registering unit

operable to register images so that the registered images represent the scene from the same viewing position and direction relative to the scene, and a pixel value interpolator operable to interpolate between the pixel values of the registered images to generate pixel values for interpolated images from the same viewing position and direction relative to the scene.

If *Robert* and *Everett* are combined in the manner suggested by the Examiner, the resultant system would include images being generated from different viewing directions in order to keep a moving object at the same position in each image. Consequently, no image registration is necessary and no pixel value interpolation is necessary. Thus, if *Robert* is modified in the way suggested by the Office Action, this would impermissibly change the principle of operation of *Robert*. Applicant submits, therefore, that a *prima facie* case of obviousness has not been made out.

Accordingly, Applicant submits that claim 1 is patentable over *Robert* and *Everett*, taken separately, or in any permissible combination (if any).

Independent claims 9 and 23 are a method and another apparatus claim, respectively, corresponding to apparatus claim 1, and are believed to be patentable for the same reasons as discussed above in connection with claim 1.

Independent claims 8, 20, and 24 include features similar to those discussed above in connection with claim 1. Accordingly, claims 8, 20, and 24 are believed to be patentable for at least the same reasons as discussed above in connection with claim 1.

The other claims in the application depend from one or another of the independent claims discussed above, and, therefore, are submitted to be patentable for at least the

same reasons as those corresponding to the independent claims. Since each dependent claim is also deemed to define an additional aspect of the invention, individual reconsideration on the patentability of each claim on its own merits is respectfully requested.

This Amendment After Final Action is believed clearly to place this application in condition for allowance and, therefore, its entry is believed proper under 37 C.F.R. § 1.116. Accordingly, entry of this Amendment, as an earnest effort to advance prosecution and reduce the number of issues, is respectfully requested. Should the Examiner believe that issues remain outstanding, it is respectfully requested that the Examiner contact Applicant's undersigned attorney in an effort to resolve such issues and advance the case to issue.

In view of the foregoing amendments and remarks, Applicant respectfully requests favorable reconsideration and early passage to issue of the present application.

Applicant's undersigned attorney may be reached in our New York Office by telephone at (212) 218-2100. All correspondence should continue to be directed to our address listed below.

Respectfully submitted,

  
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